REMARKS

The Applicants hereby submit this Amendment and Request For Reconsideration in response to the Office Action mailed on 21 March 2006. In the present Amendment, claims *1, 8-14, 18, 21, 23, 26-30 have* been amended; no claims have been added or canceled. Therefore, claims 1-2, 4, 6, 8-16, 18, and 21-30 as amended are pending for further examination.

No new matter has been added by the present amendment. The claims have been revised to clearly recite that the protective layer is a chemical-mechanical polishing (CMP) protective layer (see e.g. page 8 at lines 13-28). In addition, the claims have been revised to recite that (e.g. see claim 1) the CMP lift-off process is performed by compressing the first photoresist structure with the CMP pad until it reaches a top surface of the CMP protective layer, which provides a suitable physical barrier to protect the read sensor layers from the CMP pad (e.g. see support on page 8 at lines 13-28 of the originally-filed patent application).

In the Office Action of 21 March 2006, the Examiner maintained the rejection of claims of the present application under 35 U.S.C. Sect. 103(a) as being unpatentable over U.S. Patent No. 6,315,875 to Sasaki (hereinafter "Sasaki") in view of U.S. Patent Application Publication US 2004/0027730 to Lille (hereinafter "Lille"). In response, the Applicants respectfully submit that all pending claims of the present application are allowable over the prior art of record for at least the following reasons.

For an appropriate 35 U.S.C. Sect. 103(a) rejection, the prior art (alone or in combination) must teach or suggest each and every limitation in the claims. Also, there must be an adequate suggestion or motivation to combine the teachings of the prior art references. In the present case, the prior art fails to teach each and every claim limitation,

and there is no adequate suggestion or motivation to combine the teachings of Sasaki and Lille as provided for in the Office Action.

In the present Amendment, the claims have been revised so as to clearly recite that the protective layer utilized in the present invention is a *chemical-mechanical polishing (CMP) protective layer* – in contrast to a protective capping layer of tantalum (e.g. see Sasaki). A capping layer of tantalum does not provide a suitable physical barrier to a CMP pad during a CMP lift-off process. If it did, for example, no protective layer of carbon would ever be needed to protect the read sensor from the CMP pad.

Further, the claims as amended provide steps such as:

> performing a reactive ion etching (RIE) to remove end portions of the CMP protective layer in end regions which surround the central region without removing any of the read sensor layers, to thereby leave intact both a central protective portion of the CMP protective layer underneath the first photoresist structure and the read sensor layers;
>
> after performing the RIE and leaving the read sensor layers intact, performing an ion milling of the read sensor layers such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the first photoresist structure, to thereby define a stripe height for the read sensor;

In Sasaki, there are no adequate teachings or suggestions to utilize a RIE in the end regions *without removing any of the read sensor layers*. In fact, such a step would run counter to the teachings of Sasaki. Specifically, Sasaki emphasizes a first etching step for etching *some of the layers making up the GMR element*. See e.g. the Abstract of Sasaki. Some of these layer must include at least the top capping layer of tantalum (e.g. see column 11 at line 58 of Sasaki). In contrast, in the present claims it is recited that the RIE fails to etch the read sensor layers.

Earlier, the Examiner made the following argument in attempt to demonstrate the §103 rejection:

> "[t]he motivation for making such a modification would have been to better accomplish the goal disclosed by Sasaki of exploiting the differences between the RIE and the ion milling to ensure that the layers underneath the read sensor layers are not damaged when the read sensor layers are removed. Sasaki teaches that performing only RIE would damage the underlying shield gap layer 4a, whereas removing the read sensor layers by ion milling keeps the shield gap layer from being damaged. (Column 12, Lines 11-62) In other words, using the RIE to remove only the protective layer, as taught by Lille, would further insure that the RIE is unable to damage the shield gap layer, as desired by Sasaki.

The Applicants respectfully disagree with the Examiner's assessment above. One of the primary goals of Sasaki is to prevent the over-etching of read sensor materials with the ion milling process. See e.g. Sasaki at column 3 at lines 66-67 through column 4 at lines 1-10, stating *the problem of conventional techniques*:

> ...over-etching is required to some extent when the layers 105a, 105b, 105c are etched through ion milling. Consequently, as shown in FIG. 22, the very thin first shield gap film 104a having a thickness of 20 to 40 nm may be damaged or etched and holes may be thus formed in the shield gap film 104a. If the conductive layers 106 are formed, as shown in FIG. 23, while the first shield gap film 104a has holes, a short circuit is created between the bottom shield layer 103 and the conductive layers 106. Such a short circuit results in an increase in noise that affects the GMR element 105.

To overcome the problem of such conventional techniques, Sasaki initially uses a RIE process to etch at least some of the read sensor layers of the GMR element and subsequently uses an ion milling process to etch the remaining read sensor layers. In Sasaki, at least some of the read sensor layers etched with the RIE include the free layer of the GMR element (see e.g. 12:14-18: "The first etching is performed to etch some of the layers making up the GMR element 5, that is, a part of the thickness of the layers from the top surface. For example, this etching is performed at least as deep as the free layer 5c"). This way, the time required of the subsequent second etching (i.e. ion

milling) is kept short in order to prevent over-etching and damage to the sensor of Sasaki. See e.g. Sasaki at column 12 at lines 48-54:

> The second etching step is performed to etch only some of the layers making up the GMR element 5, instead of etching all of these layers. Therefore, the time required for performing the second etching is short. As a result, very little damage is done to the first shield gap film 4a even through ion milling is performed as the second etching.

This is the solution which Sasaki proposes.

If Sasaki were modified such that only the CMP protective layer which covers the read sensor was removed by RIE – as the Examiner suggested – then the undesirable conventional method described in relation to columns 3-4 would be practiced. That is, the second etching step of Sasaki (i.e. the ion milling) would be employed to etch through the entire read sensor and cause the undesirable sensor damage. Sasaki teaches away from such technique. See e.g. *In re Rudko*, Civ. App. No. 98-1505 (Fed. Cir. May 14, 1999). As apparent, there is no adequate suggestion or motivation to combine the teachings of Lille and Sasaki as suggested by the Examiner.

The Examiner further asserted that the motivation to combine the teachings to result in the present invention would have been to better accomplish the goal disclosed by Sasaki, to exploit the differences between the RIE and the ion milling to ensure that the layers underneath the read sensors are not damaged when the read sensor layers are removed. Certainly, however, for Sasaki to refrain from applying the RIE to any of its read sensor layers would not be exploiting the disclosed techniques to any advantage, according to Sasaki.

The Applicants further note that an invitation to explore alone is insufficient as a suggestion or motivation. See e.g. *Ex parte Obukowicz*, 27 USPQ2d 1063 B.P.A.I.

1992). Also, the motivation to combine requires desirability, not merely trade-offs. See e.g. *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 53 USPQ2d 1580 (Fed. Cir.).

Finally, the Applicants maintain that there is no adequate suggestion or motivation to utilize a CMP based lift-off technique in combination with a protective barrier in defining a stripe height (and defining both a stripe height and a trackwidth) of a read sensor. In Lille, the CMP-based liftoff technique is utilized to define a trackwidth (TW) of a read sensor. In fact, the sole purpose of Lille is to define a narrow track width for a read sensor (e.g. see title of Lille: "NARROW TRACK READ SENSOR AND METHOD OF MAKING THE SAME"). Lille is directed to the employment of "lead overlays" (see Lille in FIG. 15 at 1302 and 1304) to narrowly define the read sensor in the trackwidth dimension. Hard bias and lead layers are subsequently deposited in the end regions after defining the trackwidth. As apparent, Lille is directed to use of CMP-based liftoff only with respect to trackwidth (TW). In Sasaki, there is no teaching of utilizing the steps of Lille with any stripe height (SH) definition process. Again, there is no teaching or suggestion to utilize a CMP-based lift-off technique to define the stripe height of a read sensor. The most that might be argued based on the prior art of record is that the CMP-based liftoff technique could be used to define the trackwidth (TW) of the read sensor in Sasaki. However, this is not enough to reject the pending claims of the present application.

With respect to this point, the Applicants note that common knowledge or common sense is not enough to supply the motivation to combine teachings. See e.g. *In re Lee*, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002). Also, the motivation to combine requires desirability, not merely trade-offs. See e.g. *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 53 USPQ2d 1580 (Fed. Cir.).

Based on the above, the Applicant submit that all pending claims as amended are allowable over the prior art of record and that the present application is now in a condition suitable for allowance.

Thank you. Please feel free to contact the undersigned if it would expedite the prosecution of the present application.

~~Respectfully~~ Submitted,

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